Muon g-2 update

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Proton PMG / AEM

04-Mar-2021

https://indico.fnal.gov/event/48083

GM2-doc-db-24895-v2

Status of Offline Production

Average Efficiency

80.86%

Onsite Efficiency

65.38%

Offsite Efficiency

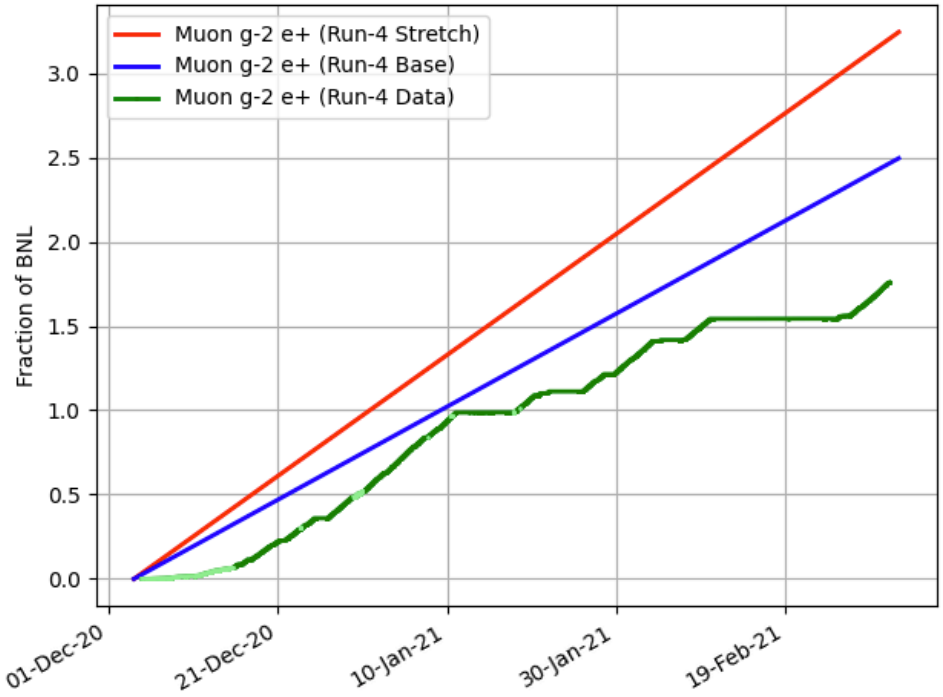
81.20%

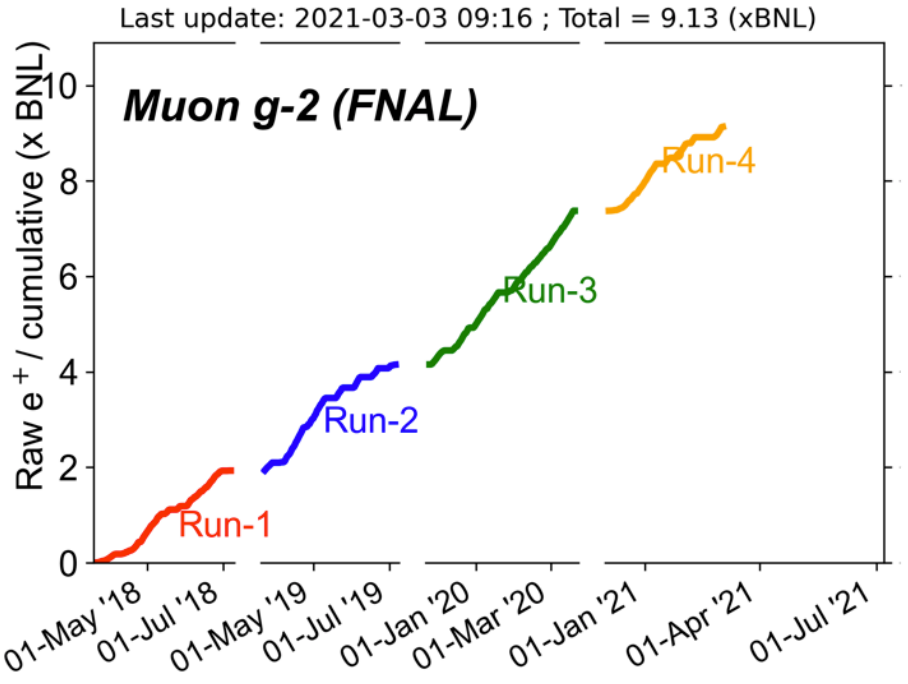
- We have stopped the offline production
  - Develop a more rigorous production procedure
    - Transparency between offline and analysis groups
    - Additional and more sophisticated validation plots
    - Requires analyzers to bless publicly new constants and algorithms
  - Add new clustering reconstruction and update tracking algorithms
    - Needed to improve algorithm efficiencies and reduce systematic uncertainties for various sources
- We are restarting production very soon
  - Recall that our production consists of four stages
    - 04-March: first stage resumes for Run-2 and -3 datasets → expect completion within 3 weeks
- We are preparing to process Run-4 data as well
  - Expect to start Run-4 processing in about 3 weeks

Fermilab

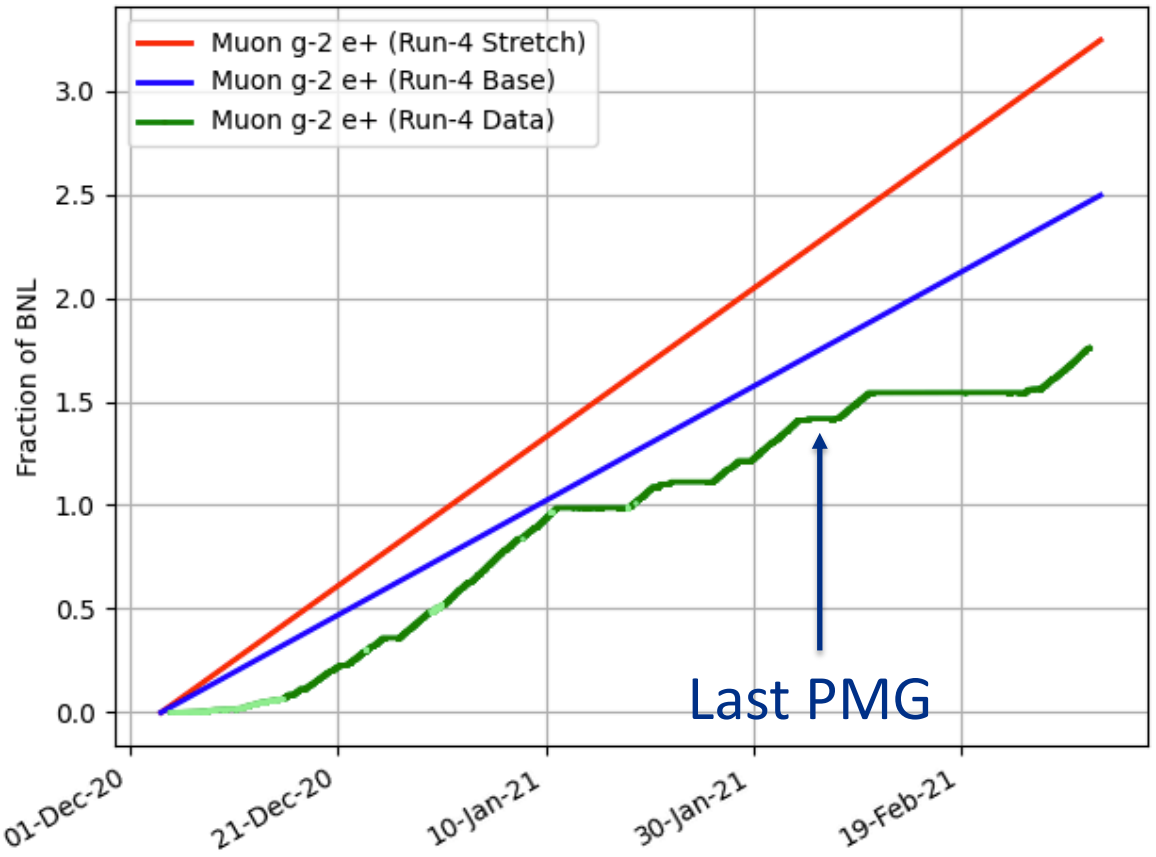
Statistics to date

- Have collected about 1.8xBNL during Run 4 so far
  - Production = 1.7, Systematic = 0.04, Test/Ignore = 0.06 xBNL



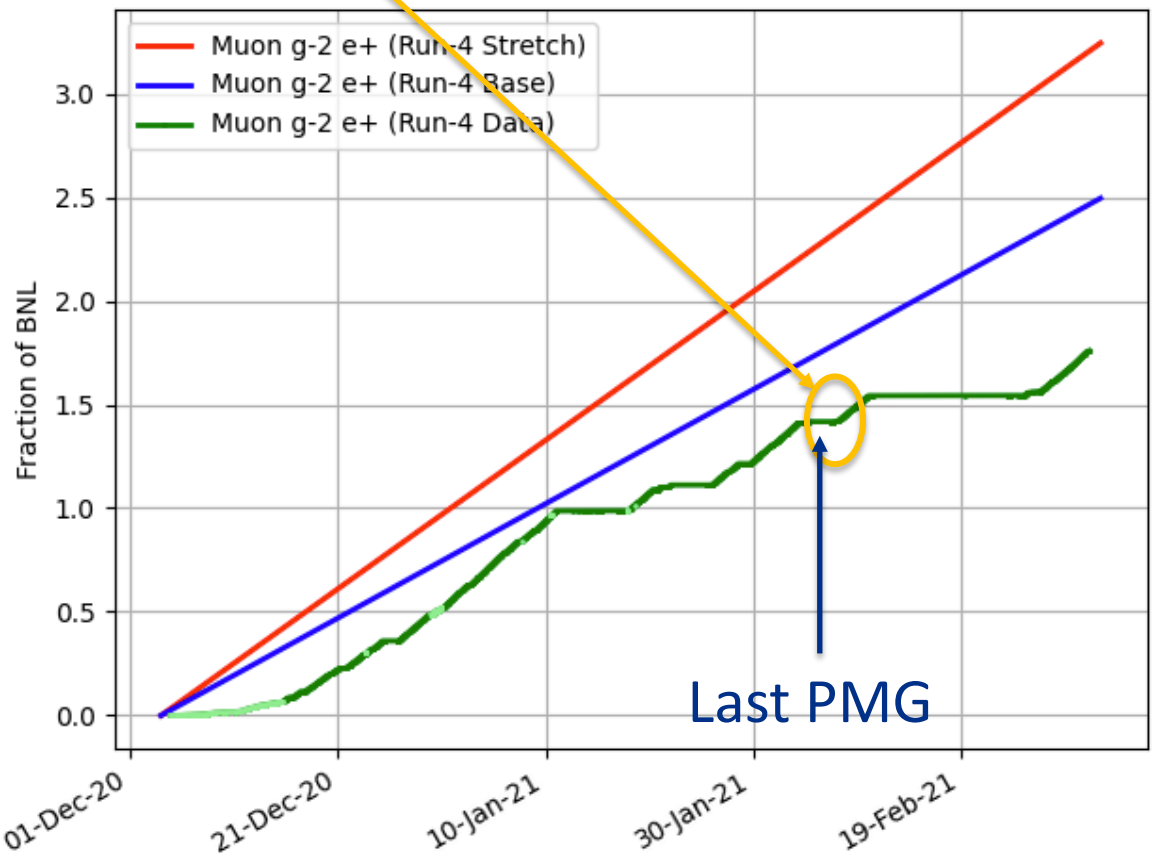


Highlights since last PMG



Highlights since last PMG

- recovered from magnet dumps
- performed IBMS calibrations



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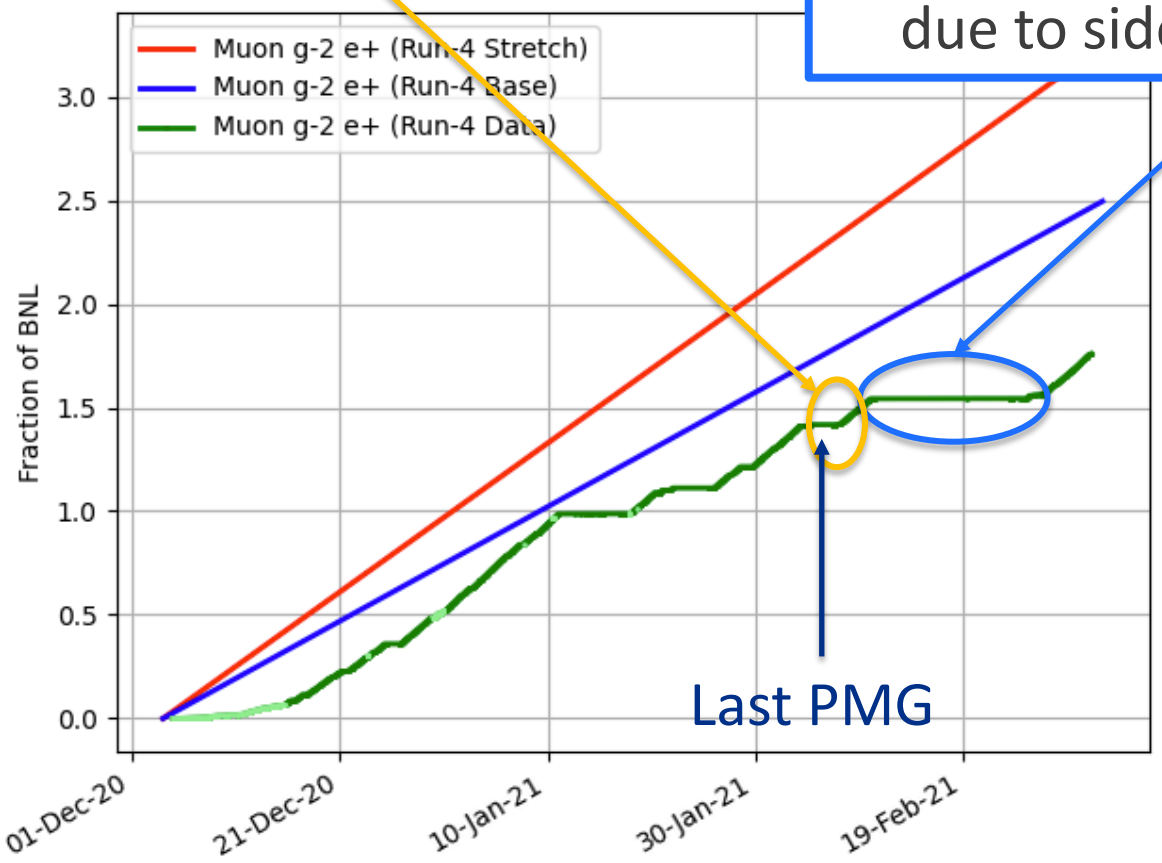
- 2 weeks down due to inflector power supply (next slide)
- Magnet slow dump / recovery due to side-wide power glitch



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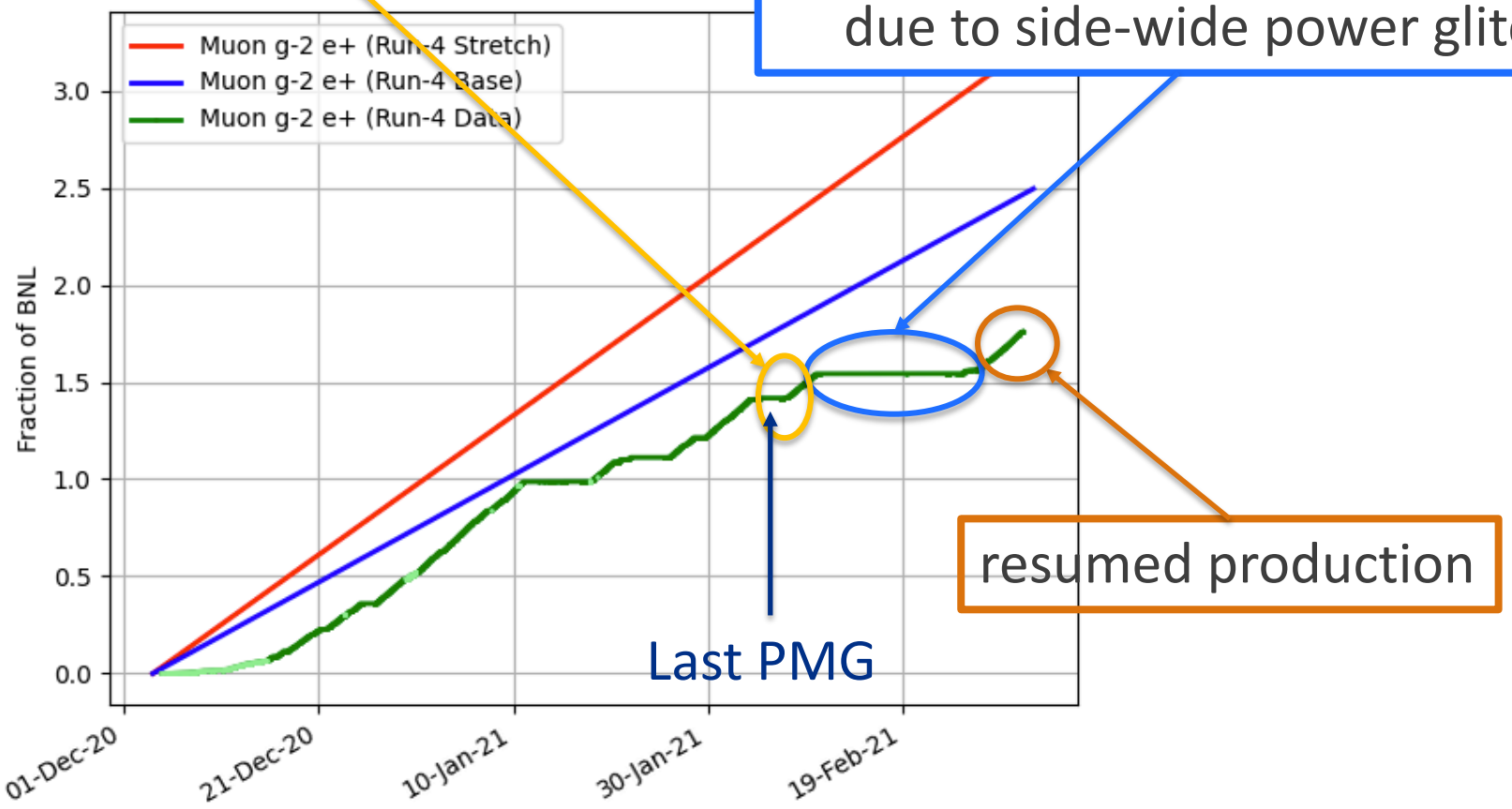
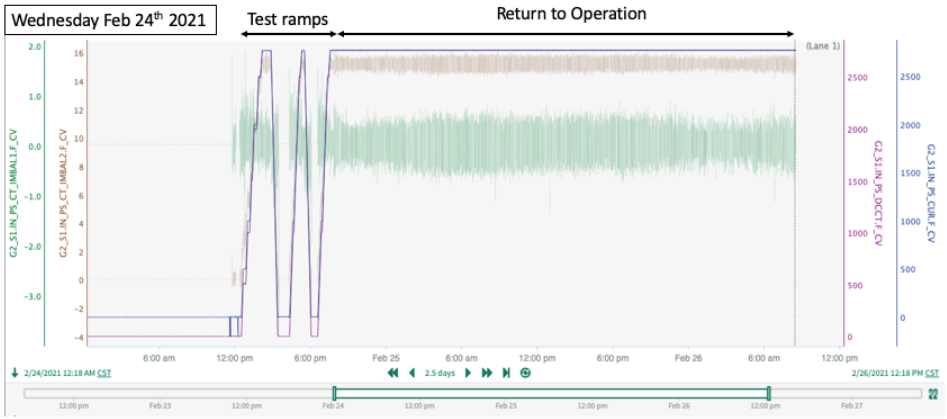
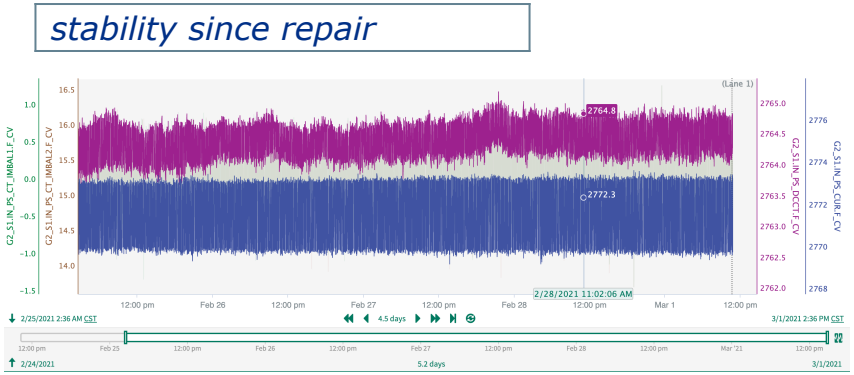


Inflector power supply

- Tuesday, Feb 9th: current regulation failed. Some internal components were found burned
- Feb 9th – Feb 24th: diagnosis and replacement of several components one at a time, in consultation with vendor
- Feb 24th: successful ramp up and confirmed current stability





Moving forward with inflector power supply

- Since the root cause of failure was not identified, we must be very careful with present power supply until spare is in hand

- For the present power supply
  - Have purchased new spare control boards
  - Keeping the damaged power unit to salvage for spare parts
  - Getting spare power units is expensive and have a long lead time so we are not pursuing that at the moment

- Help from AD EE Support Group to replace inflector Power Supply
  - Aim to replace PS during summer shutdown
  - Present power supply will become the backup PS
  - See next page…

Help from AD EE Support Group on inflector PS

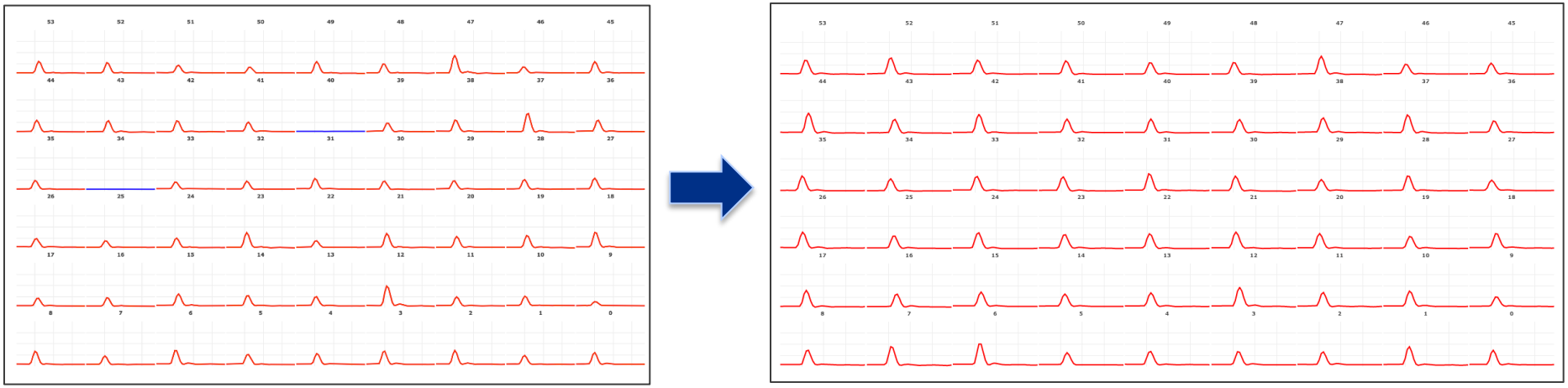
Evaluation of 2x Ametek 1200A supplies at the "Next Place"

- Chris Jensen/Steve Hays proposed using a bank of 4 air-cooled Ametek 1200A supplies in parallel
- Evaluation underway to see if g-2 requirements are met
  - magnetic footprint, size, cooling, and power
- New Ametek PS should have a similar cable interface to the g-2 PLC
- PPD will be responsible for the 2765A current bus and cooling re-work

Thank you very much for this important work to keep g-2 running!

Repairs in the shadow of the inflector repair

- Fixed dead channels in calo 5

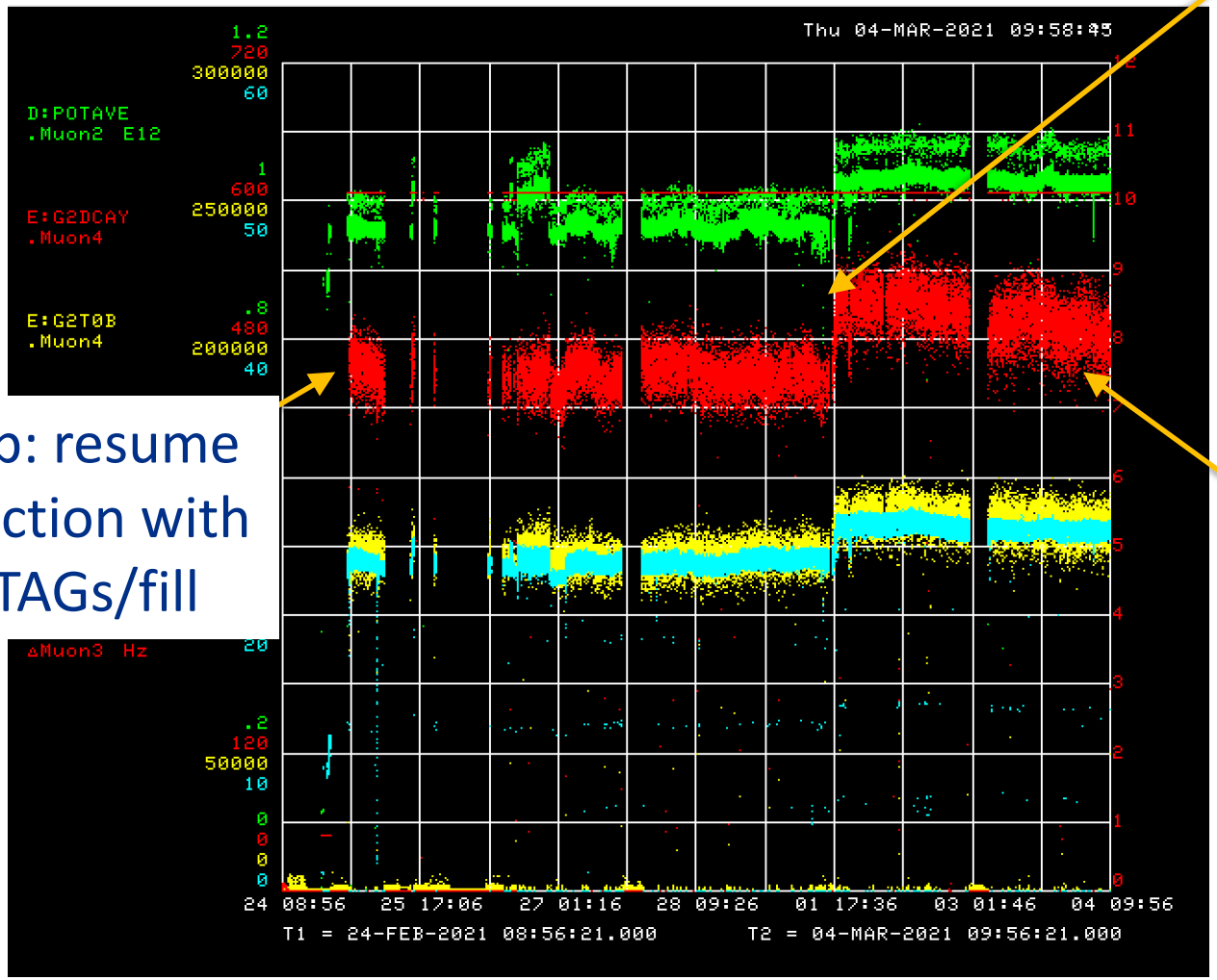


- Repeated calibrations for calo 5:

- ☑ Filter wheel scans to establish gain settings
- ☑ Laser templates
- ☑ Laser calibrations (STDP)
- ❑ MIPs runs for energy and time correction
- ❑ Beam templates
- ❑ Laser calibrations (LTDP)

- As well, two calorimeter fuses blew and were replaced

g-2 performance since inflector repair



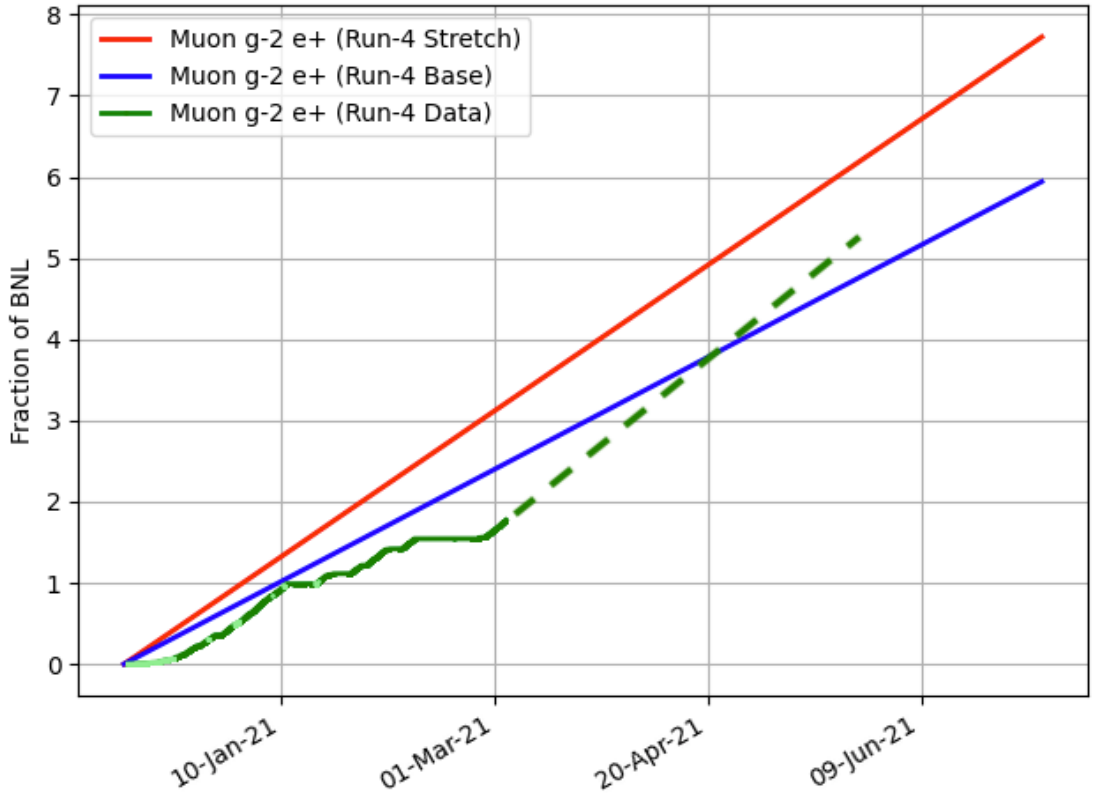
24-Feb: resume production with 480 CTAGs/fill

02-Mar: CTAGs increase due to beam tuning by Jim & increased POT by Booster → Thank you!

03-Mar: CTAGs decrease after Trolley Run… then drift a bit… → Will continue to monitor and may do kicker, inflector scans

March Outlook

- Assuming last week's performance can continue, we expect to catch up to the blue line by mid-April



Wish us luck!

Plan: stage roll out of fully remote shifts

- Feb + Mar: 1x local (A) + 1x remote (B). Solve known issues
  - Confirm mode of communication with MC-1, MCR, RunCos, experts
    - Many thanks to ANNIE, ICARUS, MicroBooNE, NOvA for very helpful discussions on Google Voice
  - Resolve technical issues for remote shift ops (e.g., alarms to slack)
  - Update procedures (e.g., accesses)

- First half of April: 1x remote (A) + 1x local (B)
  - … with remote as Shifter "A", local as Shifter "B"
  - This gives the power to the remote shifter with the local as "backup"

- Second half of April: 2x remote shifters during weekday shifts
  - On other shifts, 1x remote (A) + 1x local (B)

- May – June: 2x remote shifters
  - Assuming all goes well in the steps above… Stay tuned!